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We Must Establish the Basic Machine-building Standards

Chi-chieh Chih-tsao, Shanghai, 15 May 1950

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UNIFORM STANDARDS FOR MECHANICAL ENGINEERING

(We Must Establish the Basic Machine-Building Standards)

I. GREAT CONFUSION RESULTS FROM A LACK OF UNIFORM STANDARDS

China used to be a semicolonial and semifeudal state; this was fully reflected in China's industry which was built on very weak foundations. In the past China's machine-building industry was primarily devoted to assembling. The machine-building industry had no standards of its own; it followed German assembly standards when it purchased machine parts from Germany; and it followed English or American standards when it obtained parts from England or America. Great confusion resulted. Unless we clear up this confusion persisting from the past, the present machine-building industry can hardly fulfill its vital objectives in the nationwide economic reconstruction program.

A gigantic industrialization program is about to begin. It is imperative that we establish uniform industrial standards at the very beginning of the reconstruction program, for without such uniform standards more confusion will follow.

II. MEASURES AND WEIGHTS SHOULD BE ABSOLUTELY UNIFIED

Despite the standard measures and weights issued by the Kuomintang regime, deep rooted tradition has prevented their nationwide adoption. Thus, in the machine-building industry some firms adopted the metric system while others used the English system, and still others simultaneously applied the metric, the English, and the American systems. Therefore, the government must pass a law to enforce a single nationwide system of measures and weights.

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In the Council of Ministers of the Soviet Union there is a Committee on Weights and Measures which supervises the use of international measures and weights as standard units of measurement. To enforce a uniform system of measurements, the Soviet Union passed a law entitled "Decree on the Inspection of Measures, Weights, and Testing Instruments." Under this law, newly made measures, weights, and testing instruments must be examined and certified by government authorities before they can be used. Strict provisions were made by the Committee on Weights and Measures with respect to the following:

1. General regulations for the inspection of measures, weights, and test instruments.

2. Practical rules for the application of the laws involved.

3. Punishment of offenders.

An absolutely uniform system of measures and weights is a prerequisite for industrial standardization. The experience of the Soviet Union in enforcing a uniform standard is a good reference for us to consult.

III. STEPS FOR DETERMINING STANDARDS

The unification of measurement standards paves the way for industrial standardization; on the basis of a standard weights and measures system we can, step by step, devise various standards for industry. However, industrial standardization cannot be accomplished in a short time; we can only do it step by step and

according to plan. Hence the government should set up a permanent organization, in cooperation with engineering societies, research institutions, and trade associations, for designing a system of standards. We suggest the following steps:

1. The organization responsible for choosing the standards must present a draft of the standards.

2. It should encourage government agencies, schools, and factories concerned to critically discuss and examine the proposed standards.

3. The government, after reviewing suggestions made by various organizations, must select provisional standards to be adopted on a trial and error basis by government agencies and factories. In the meantime, specific plants will be appointed to manufacture rules, scales, and other instruments used in measurement.

4. During the experimental period, experienced engineers will be assigned to observe the actual use of the standards and the consequences of their introduction. These engineers will give instructions on the use of the proposed standards.

5. After the trial period and the final revision, the government will promulgate a unique system of standards, preferably referred to as "State Standards", which will be strictly observed by all concerned. In the Soviet Union those who violate the State Standards are punished. Of course, such State Standards may be subject to revision in accordance with the technical progress, but

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revisions must be made according to legalized procedure.

6. For the enforcement of the State Standards, an inspection organization should be established to undertake chemical and physical tests of various industrial products in accordance with the standards. It should make careful tests on measures and weights, particularly those used in the machine-building industry.

IV. STANDARDIZATION OF BASIC MECHANICAL ENGINEERING COMPONENTS

Standardization of the basic components used in mechanical engineering includes the following:

1. Standardization of mechanical drawing and drafting, including the standardization of paper, methods of projection, size of drawn lines, symbols, etc.

2. Standardization of various screw threads and worm-threads

3. Standardization of fits and tolerances in machine part assembling

4. Standardization of the most frequently used machine parts including:

(1) Screw heads, washers, nuts, etc.

(2) Bolts

(3) Conveyor parts such as couplings, clutches, conveyor chains, conveyor belts, bearings, etc.

(4) Cog-wheels, gears, gear wheels, etc.

5. Small tools such as drills, grinding wheels, drilling heads, boring taps, milling cutters, etc.

6. Measurements used in precision mechanical engineering, such as micrometers, French curves, rules, etc.

7. Standardization of the types, sizes and grades of basic industrial materials, such as cast iron, steel, copper, bearing alloys, etc.

Tolerances shall be established for carrying out the above-mentioned standardizations.

We are of the opinion that the following proposal should be adopted by the government and other organizations concerned:

1. Standardization of screw threads is our most important task at present. We should publish state standards, thereby enabling industrial plants to make necessary preparations for adopting the standards.

Though China may adopt the metric system for standardization purposes, most of the present small scale machine-part manufacturers employ the English system in cutting screw threads. Some plants now make screw threads according to the English system, while others make worm-threads after American standards. This greatly reduces the interchangeability of various machine parts and results in confusion. Until we find a better system, we should immediately issue a provisional system for nationwide use.

2. Many countries recognize the preferability of the metric

system, but it is too late for Britain and America to change their systems, since they have used them for so long. Because we are still in the beginning stages of industrial development, we can choose the system we prefer, which is the metric system. Hence, we should use the international standards in proceeding with the standardization of screw threads. In our opinion, the CIS [Conference of International Standards] report on standardization serves as a very good guide in this respect.

3. The standardization of machine elements such as small tools, precision measuring and testing instruments, and basic industrial materials is of great importance, because these form the very foundation of industrial standardization. Thus, we should determine which standard to adopt, and distribute samples of these standards to hurry the completion of national industrial standardization.

4. Because we do not have too much time, we can not wait for the government to carry out nationwide standardization; we should organize group discussions among Shanghai's industrial plants, engineering societies, schools, trade associations, etc. The discussion group should draft plans for implementing standardization and recommend them to the government. In fact, the CIS has drafted very good plans which we may adopt, with necessary revisions. Thus the preparation of plans will not take a long time; it is not a difficult matter, but it calls for immediate action. If we act we will succeed in introducing industrial standardization. We suggest that various organizations such as the Shanghai Machine Manufacturers Association and the various mechanical engineering

societies include the preparation of plans for standardization before the end of the year, as a target task for this year.

5. After basic standards have been established, we may proceed to more specific standardization such as the standardization of automobile parts, textile machine parts, machine tool parts, ammunition parts, etc.

V. STANDARDIZATION OF TYPES, SIZES, GRADES AND OTHER SPECIFICATIONS

Standardization of types, sizes, and grades offers great advantages to industrial manufacturing, especially to machine building. The standardization of types, sizes, and grades of machines and parts is the only way to bring the producers and the buyers together. Recently it was reported that the standards, as determined by the Machine-Building Industrial Conference, were not adequate, and rendered it impossible for the machine-building plants to complete their targets on schedule. In some cases the products are entirely unsuitable for use because the standards are not correct; this results in waste. Apparently if the products are standardized the users will be able to get the proper parts, and the manufacturers can devote their entire effort to producing parts of uniform standards. Schools and research organizations should promote product standardization. Trade associations may set up committees for giving their customers information about standardization.

The standardization of names is also of great importance, although it is less important than the standardization of types,

sizes, and grades. We point out that a standard name need not be too "academic"; instead, it should be a popular, though comprehensible name. It should be simple; easily written and pronounced. We may not be able to adopt a definitive name for a product because of the different dialects which give the same product different names. However, we may give the most popular name after the standardized one so that everyone will understand.

We hope to hear reactions to this article from various circles.

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